

Elementary Algebra Topics

Name _____

Elementary Algebra (17%) (10-11 questions). EXAMPLES taken from previous ACT practice tests

Properties of Exponents and Square Roots

22. For all $a > 1$, the expression $\frac{3a^4}{3a^6}$ equals:

F. $\frac{1}{2}$

G. $-a^2$

H. a^2

J. $-\frac{1}{a^2}$

K. $\frac{1}{a^2}$

35. $(3x^3)^3$ is equivalent to:

A. x

B. $9x^6$

C. $9x^9$

D. $27x^6$

E. $27x^9$

36. Which of the following is equivalent to the inequality $4x - 8 > 8x + 16$?

F. $x < -6$

G. $x > -6$

H. $x < -2$

J. $x > 2$

K. $x < 6$

40. If there are 8×10^{12} hydrogen molecules in a volume of 4×10^4 cubic centimeters, what is the average number of hydrogen molecules per cubic centimeter?

F. 5×10^{-9}

G. 2×10^3

H. 2×10^8

J. 32×10^{16}

K. 32×10^{48}

45. Which of the following is a rational number?

- A. $\sqrt{2}$
- B. $\sqrt{\pi}$
- C. $\sqrt{7}$
- D. $\sqrt{\frac{5}{25}}$
- E. $\sqrt{\frac{64}{49}}$

49. In the real numbers, what is the solution of the equation $8^{2x+1} = 4^{1-x}$?

- A. $-\frac{1}{3}$
- B. $-\frac{1}{4}$
- C. $-\frac{1}{8}$
- D. 0
- E. $\frac{1}{7}$

YOU TRY Properties of Exponents and Square Roots:

1. The value of $(2.5 \cdot 10^5)^2$ is equal to which of the following?

- F. $6.25 \cdot 10^7$
- G. $6.25 \cdot 10^{10}$
- H. $2.5 \cdot 10^{10}$
- J. $2.7 \cdot 10^{10}$
- K. $5 \cdot 10^7$

2. If $n^x \cdot n^8 = n^{24}$ and $(n^6)^y = n^{18}$, what is the value of $x + y$?

- A. 7
- B. 9
- C. 12
- D. 19
- E. 27

3. $\frac{10^3(10^5 + 10^5)}{10^4} = ?$

- F. 10^4
- G. 10^6
- H. $2(10^2)$
- J. $2(10^4)$
- K. $2(10^9)$

4. $2^0 + 2^3 - 2^{-2} = ?$

- A. 4
- B. $6\frac{1}{4}$
- C. 7
- D. $8\frac{3}{4}$
- E. $9\frac{3}{4}$

Evaluation of Algebraic Expressions through Substitution

1. What is the value of the expression $6x - [7 - 2(3x - 10)]$ when $x = 5$?

- A. -27
- B. -17
- C. 13
- D. 33
- E. 87

2. When $x = -2$, what is the value of $x^3 - x + 3$?

- A. -5
- B. -3
- C. -1
- D. 9
- E. 13

Using variables to express functional relationships

2. A consultant charges \$45 for each hour she works on a consultation, plus a flat \$30 consulting fee. How many hours of work are included in a \$210 bill for a consultation?
- F. 2
G. 4
H. -4
J. 5
K. 7
24. The fixed costs of manufacturing basketballs in a factory are \$1,400.00 per day. The variable costs are \$5.25 per basketball. Which of the following expressions can be used to model the cost of manufacturing b basketballs in 1 day?
- F. $\$1,405.25b$
G. $\$5.25b - \$1,400.00$
H. $\$1,400.00b + \5.25
J. $\$1,400.00 - \$5.25b$
K. $\$1,400.00 + \$5.25b$
27. A hot-air balloon 70 meters above the ground is falling at a constant rate of 6 meters per second while another hot-air balloon 10 meters above the ground is rising at a constant rate of 15 meters per second. To the nearest tenth of a second, after how many seconds will the 2 balloons be the same height above the ground?
- A. 8.9
B. 6.7
C. 2.9
D. 0.4
E. 0.2
58. For every positive 2-digit number, x , with tens digit t and units digit u , let y be the 2-digit number formed by reversing the digits of x . Which of the following expressions is equivalent to $x - y$?
- F. $9(t - u)$
G. $9(u - t)$
H. $9t - u$
J. $9u - t$
K. 0

YOU TRY Using variables to express functional relationships:

1. Guillermo earns take-home pay of \$6.75 per hour. Out of his next paycheck, he would like to buy 3 books for \$7.48 each and rent 4 video games for \$5.34 each (both prices include tax). Let n represent the number of hours for which Guillermo is paid on his next pay-check. Which of the following inequalities, when solved, gives the values of n that allow Guillermo to buy the books and rent the video games?

- F. $7.48 + 5.34 \leq n$
- G. $7.48 + 5.34 \leq 6.75n$
- H. $7(7.48 + 5.34) \leq 6.75n$
- J. $3(7.48) + 4(5.34) \leq n$
- K. $3(7.48) + 4(5.34) \leq 6.75n$

Understanding Algebraic Operations

4. $t^2 - 59t + 54 - 82t^2 + 60t$ is equivalent to:
- F. $-26t^2$
 - G. $-26t^6$
 - H. $-81t^4 + t^2 + 54$
 - J. $-81t^2 + t + 54$
 - K. $-82t^2 + t + 54$
6. The expression $(4z + 3)(z - 2)$ is equivalent to:
- F. $4z^2 - 5$
 - G. $4z^2 - 6$
 - H. $4z^2 - 3z - 5$
 - J. $4z^2 - 5z - 6$
 - K. $4z^2 + 5z - 6$
8. The 6 consecutive integers below add up to 447.

$$\begin{array}{r} x - 2 \\ x - 1 \\ x \\ x + 1 \\ x + 2 \\ x + 3 \end{array}$$

What is the value of x ?

- F. 72
- G. 73
- H. 74
- J. 75
- K. 76

46. If $a < b$, then $|a - b|$ is equivalent to which of the following?

- F. $a + b$
- G. $-(a + b)$
- H. $\sqrt{a - b}$
- J. $a - b$
- K. $-(a - b)$

YOU TRY Understanding Algebraic Operations:

1. $(x + 2)(x - 4) - (x + 4)(x - 2) = ?$

- F. 0
- G. $2x^2 + 4x - 16$
- H. $-4x$
- J. $4x$
- K. $-4x - 16$

2. The expression $5(x - 1)$ is equivalent to:

- A. $5x - 5$
- B. $5x - 4$
- C. $5x - 1$
- D. $x - 5$
- E. $-5x$

3. If $-2x + 5 = 2 - (5 - 2x)$, then $x = ?$

- F. 6
- G. 5
- H. 4
- J. 3
- K. 2

4. What is the solution of $5y + 3 = 2y - 18$?

- F. -7
- G. -5
- H. -3
- J. 5
- K. 7

5. For 2 numbers, c and d , c is 4 less than the product of 3 and the number d . Which of the following is an expression for c , in terms of d ?

A. $3(d + 4)$
B. $3(d - 4)$
C. $4 - 3d$
D. $3d + 4$
E. $3d - 4$

6. Which of the following expressions correctly describes the mathematical relationship below?

3 less than the product of 4 times x

F. $4x - 3$
G. $3x - 4$
H. $4(x - 3)$
J. $3(4x)$
K. $\frac{4x}{3}$

7. If $\frac{3}{4}$ of x is 36, then $\frac{1}{3}$ of $x = ?$

A. 9
B. 12
C. 16
D. 24
E. 42

8. If $12 + x = 36 - y$, then $x + y = ?$

F. -48
G. -24
H. 3
J. 24
K. 48

9. For a positive integer k , which of the following equals $6k + 3$?

F. $\frac{1}{2}(k + 1)$
G. $\frac{1}{k} + 4$
H. $2k + 1$
J. $3(k + 1)$
K. $3(2k + 1)$

Solution of quadratic equations by factoring

21. What values of x are solutions for $x^2 + 2x = 8$?

- A. -4 and 2
- B. -2 and 0
- C. -2 and 4
- D. 0 and 2
- E. 6 and 8

YOU TRY Solution of quadratic equations by factoring:

1. Which of the following is an element of the solution set of the equation $x^2 + 6x + 8 = 0$?

- A. -8
- B. -2
- C. 4
- D. 6
- E. 8

2. If 1 of the roots of the equation $x^2 + kx - 12 = 0$ is 4, what is the value of k ?

- F. -1
- G. 0
- H. 1
- J. 3
- K. 7

3. Which of the following represents $-7t + 6t^2 - 3$ when it is completely factored?

- A. $(3t - 1)(2t + 3)$
- B. $(3t + 1)(2t - 3)$
- C. $(6t - 1)(t + 3)$
- D. $(6t + 1)(t - 3)$
- E. $(2t - 1)(3t + 3)$

4. What is the solution set for the following equation: $x^2 - 5x + 4 = 0$?

- A. $\{-4, -1\}$
- B. $\{-3, -1\}$
- C. $\{-1, 3\}$
- D. $\{1, 4\}$
- E. $\{2, 3\}$